

Serial No.: 09/457,434 Filed: 12/07/1999
Amendment dated: October 23, 2003
Reply to Office Action of: January 19, 2004
Atty. Docket No.: HEN-9910 (P1998J107)

REMARKS

Claim 1 has been amended to include the step of injecting fresh hydrogen-containing treat gas into the second reaction stage. Support for this amendment can be found on page 8, last paragraph, of the instant specification.

Applicants request that the Examiner enter amended claim 1.

REJECTION UNDER 35 U.S.C. 103(a)

Claims 1-11 have been rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Number 5,114,562, Haun et al. ("Haun").

EXAMINER'S POSITION

It is the Examiner's position that Haun teaches a mineral oil conversion process that includes hydrodesulfurization and hydrogenation steps performed in separate reaction zone. The Examiner states that the subject invention specifically relates to the hydrogenation of distillate petroleum fractions to produce low sulfur content products including diesel and jet fuel and that the feedstock can include virtually any middle distillate.

The Examiner also has considered applicants' arguments in the communication entitled "Response to Final Office Action after Request for Continued Examination", but found these arguments lacked merit.

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APPLICANT'S POSITION

Applicants respectfully disagree with the Examiner. It is applicants' position that one having ordinary skill in the art and knowledge of Haun at the time the invention was made would not have found it obvious to arrive at the presently claimed invention.

As presently amended, fresh hydrogen containing treat gas is injected directly into the second reaction stage. The vapor products produced from the second reaction stage are then passed into the first reaction stage to be used as once through hydrogen-containing treat gas therein. A feed is conducted into the first hydrodesulfurization reaction stage and the reactant from the first reaction stage is passed to a separation zone wherein a vapor phase stream and a liquid phase stream are produced. The liquid phase stream is then conducted into the second reaction zone.

Haun does not teach this process configuration. Haun teaches that "A first portion of the hydrogen recovered from the second zone is recycled to the second zone", and "a second portion is passed to the first (desulfurization) zone." See Haun, col. 5, lines 13-21. Haun does not teach that its process can operate without recycling a portion of the gas from the second reaction zone to the second reaction zone. Haun teaches that "preferably from about 35 to 70 volume percent of this gas recovered from the second reaction zone, is passed to the first reaction zone... A remaining second portion is admixed with the gas of line 18 and passed into the treating zone for hydrogen sulfide removal." See Haun, col. 8, lines 18-25. It should be noted that this is an incorrect reference in the Haun patent since the line carrying this gas is given reference numeral 33 and reference numeral 18

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denotes the vapors leaving separator 17. Line 18(33) of Haun is mixed with the vapor exiting separator 17 and is treated to remove H_2S in unit 21; this stream, line 22, is then mixed with the feed to reactor 23, the second reaction zone. See the Haun Figure. Thus, Haun teaches a recycle loop for the hydrogen gas used therein around the second reaction zone. Further, Haun teaches that it is within this stripping zone that the fresh hydrogen for the Haun process is added. The stripping vapor containing this hydrogen is then separated in separator 17 and mixed with the portion of the vapor from the second reaction zone being recycled to the second reaction zone.

As amended, the fresh hydrogen-containing treat gas used in the instantly claimed invention is introduced into the second reaction stage not a stripping zone. The present invention gains further efficiency by not requiring recycle of treat gas. See page 9, first paragraph of the instant invention.

Further, the instant invention claims the use of once-through hydrogen-containing treat gas, which is cascaded from the second reaction zone. This once-through hydrogen-containing treat gas comprises all of the vapor product exiting the second reaction zone. None of the vapor exiting the second reaction zone is used within a recycle loop around the second reaction zone as taught by Haun. The introduction of the fresh hydrogen-containing treat gas directly into the second stage reactor allows the second stage reactor "to be operated more efficiently owing to a reduction in the activity suppression on the catalyst exerted by H_2S and NH_3 and an increase in H_2 partial pressure." See page 9, first paragraph of the instant specification.

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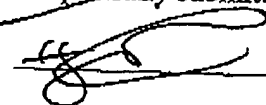
Thus, it is applicants' position that one having ordinary skill in the art and knowledge of Haun would find the instantly claimed invention obvious. Haun does not teach the use of once-through hydrogen-containing treat gas. On the contrary, Haun teaches a recycle loop around the second reactor disclosed therein. Also, Haun does not teach the addition of fresh hydrogen directly into the second reaction zone as presently claimed. Instead, Haun teaches to add fresh hydrogen into a stripping zone and use the vapor from the stripping zone, after H₂S removal and pressurization, along with a portion of the vapor product from the second reaction zone, as the treat gas in the second reaction zone.

The Examiner is requested to reconsider and withdraw this rejection.

Based on the preceding arguments and amendments, the Examiner is requested to reconsider and withdraw all rejections and pass this application to allowance. The Examiner is encouraged to contact applicants' attorney should the Examiner wish to discuss this application further.

Respectfully submitted:

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Jeremy J. Kliebert, Registration No. 48,227
Attorney for Applicant
Telephone: (225) 977-1592
Facsimile: (225) 977-1025

Correspondence Address:
ExxonMobil Research and Engineering Company
P. O. Box 900
Annandale, New Jersey 08801-0900